Shizu KUZUHA*: **A new acephalous species of *Piptocephalis* (Mucorales)**

葛葉　静*: Head-cell を欠くエダカビ属（ケカビ目）の1新種

Piptocephalis minuta Kuzuha, sp. nov. (Fig. 1-2)

Hyphae vegetativae ramosae, septatae, hyalinae, 0.5-2.3 μ diam. Sporophora aetate septata, laevia, hyalina; axibus principalibus 10-120 (-500) μ longis, 1.1-2.4 μ latis, apicaliter usque quinquiens dichotome ramosis; ramis 5-70 μ longis; ramis ultimis (0.5-)2-25(-38) μ longis, 0.5-1.4 μ latis. Merosporangia terminalia, solitaria, cylindrica, aliquando furcata, plerumque 2-5 sporas capientia. Sporae plusminusve cylindricae, (1.5-)3-10(-12.5) μ longae, (2.0-)2.3-3.3 μ latae. Zygosporae globosae, brunneae, 22-38 μ diam.; muro crasso, projecturas conicas ex aliquot spinulis constantes habenti.

Hab. in soil collected by S. Tokumasu, Rebun Isl., Hokkaido (Sep. 27, 1970). Holotype (Kuzuha no. 388) preserved in TNS.

Other specimens examined: from soils; Mt. Kirishima, Kagoshima Pref., Feb. 1971 (no. 579); Shiriyazaki, Aomori Pref., Sep. 1973 (nos. 973, 976); Miura City, Kanagawa Pref., Jun. 1974 (no. 1016-2).

This fungus was isolated on malt extract agar with *Mortierella* sp. as a host. Spores swelled up gradually and put forth 1-6 germ tubes from thinner lateral sides. In the absence of a host, growth of the germ tubes ceased sooner or later. But when they met successfully with suitable host hyphae, there formed appressoria and haustoria, and further development occurred.

Vegetative hyphae were branched, septate, hyaline and 0.5-2.3 μ in diam. Sporophores arose as lateral branches from prostrate or ascending aerial hyphae and branched up to five times dichotomously. Rhizoids were not observed. Main stalks of the sporophores were 10-120(-500) μ long by 1.1-2.4 μ wide and scarcely differentiated from the supporting parental hyphae. Branches of the primary dichotomies were (3-)10-70 μ long, the penultimate branches 3-27 μ long and the ultimate branches (0.5-)2-25(-38) μ long by

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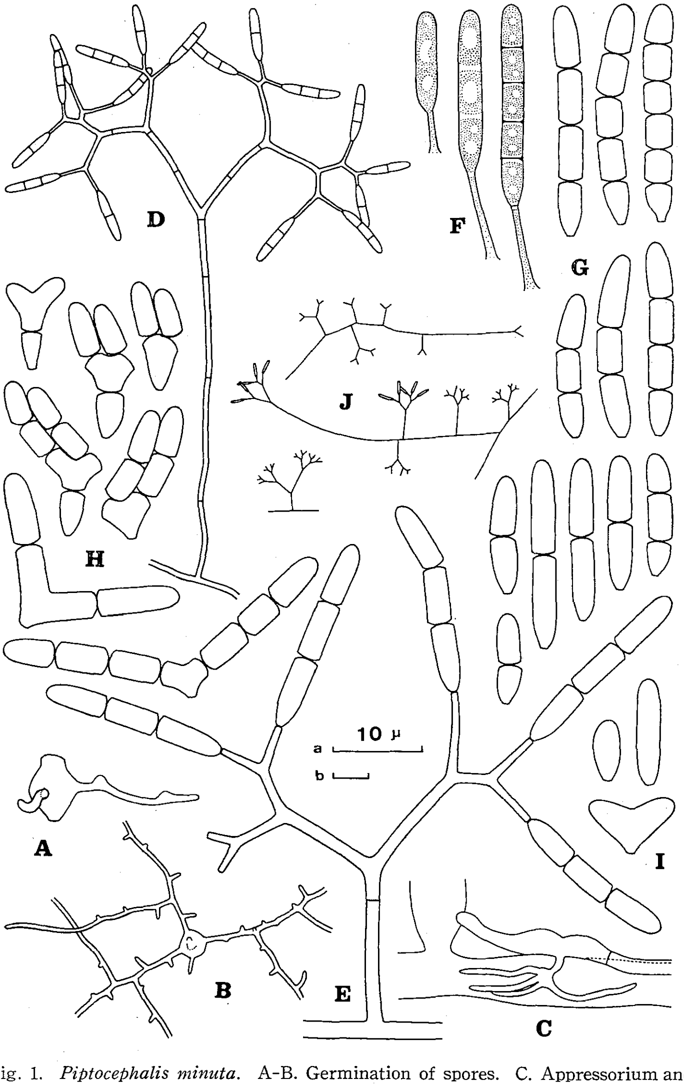

Fig. 1. *Piptocephalis minuta*. A-B. Germination of spores. C. Appressorium and haustorium in a host hypha. D-E. Sporophores with merosporangia. F. Developing merosporangia. G. Simple merosporangia and spores. H. Branched merosporangia and spores. I. Merosporangia containing only one spore. J. Habit sketch of prostrate hyphae and sporophores. (Scale b for B and D).

0.5-1.4 μ wide. Sporophores became septate in age but septation took place less frequently in the ultimate and penultimate branches. Modifications of septa like tubular perforations were not found.

Sporophores remained smooth and hyaline, namely, they showed neither striation nor coloration which are often remarkable on well developed, stout sporophores of most other species. Merosporangia were produced terminally and singly on each apex of the ultimate branches. Head-cells were completely lacking. Merosporangia were cylindrical, simple or sometimes once furcate, and segmented into (1-)2-5(-7) spores. Spores were cylindrical and (1.5-)3-10(-12.5) μ long by (2.0-)2.3-3.3 μ wide. Terminal ones were somewhat triangular and those at branching points were cuneiform. The disjointed spores conglomerated and formed a spore drop under moist conditions. The process of spore formation was fundamentally similar to that described for *P. indica* B.S. Mehrotra & Baijal by Benjamin (1966) except that the end walls of adjacent spores of *P. minuta* were laid down close together at the middle of narrow hyaline zones. Merosporangial remnants were inconspicuous and seemed to disappear concurrently with disarticulation of spores whereas in *P. indica* they are very prominent and persistent after germination of spores.

One or two weeks after two-membered culture was started, zygospores were produced abundantly on or mostly below the surface of substrata. Their development followed the typical pattern of the genus which is well summarized in Benjamin (1959). Apposed progametangia were sometimes nearly parallel, sometimes curved outward. The degree of this curvature varied considerably in this species. Apical copulation of two progametangia or gametangia was followed by zygospore formation from the point of fusion. The zygospore enlarged more rapidly toward above the point of fusion, and during young stage many wart-like projections appeared on the wall. Becoming spine-like by elongation, these projections aggregated to form larger, compound projections. Mature zygospores were globose, brown to dark brown and 22-38 μ in diam. The exospore (zygosporangium wall) was roughened with many irregular, conical or truncate-conical projections; the latter was composed of spine-like smaller units and up to 3.5 μ high. The endospores were globose, slightly bulged into the gametangial remnants, hyaline and 15-31 μ in diam. The endospore-wall was smooth and about

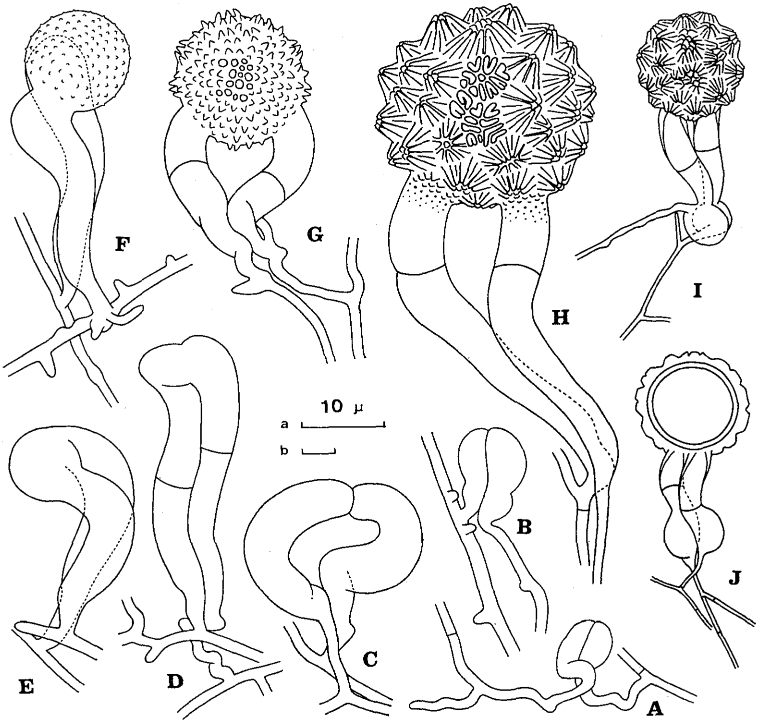

Fig. 2. *Piptocephalis minuta*. A-B. Apposed progametangia. C. Copulation of progametangia. D. Apically fused gametangia. E. Formation of a zygospore bud. F-G. Developing zygospores. H. Mature zygospore (type strain). I-J. Mature zygospores showing basal hypertrophy in the suspensors and an endospore (strain no. 973). (Scale b for I and J).

1-2.5 μ thick. With maturation of zygospore, minute warts appeared also on the upper region of the gametangial remnants, whilst the suspensors remained smooth. Notwithstanding the abundant formation of zygospores in the type strain, these were not produced when the other two strains (nos. 976, 1016-2) were cultured in two-member under the same conditions. In the strain no. 973, zygospores were obtained only on the isolation plate but not in culture. Most of their suspensors, however, had a more or less swollen basal portion and in this respect the strain no. 973 disagreed with the type.

The basal hypertrophy of suspensors in the genus *Piptocephalis* was first mentioned for the zygospores of *P. xenophila* Dobbs & English by Leadbeater & Mercer (1957), who remarked as "Maturity brings about no changes in colour but is marked by extra septation and/or characteristic basal hypertrophy in the suspensors." So far as the present species is concerned, the basal hypertrophy of suspensors does not seem stable but rather variable depending on strains. Since it was ascertained that three zygospores were formed between hyphal branches derived from single hypha, this fungus is presumed to be homothallic.

The genus *Piptocephalis* was established by Brefeld in 1872 on the basis of *P. freseniana* and, up to the present, more than twenty species have been described. As its name indicates, this genus has best been characterized by a "head-cell", the deciduous merosporangia-bearing cell (Dobbs & English 1954). But recently the definition has been extended to include several other species whose head-cells are nondeciduous, or lytic, or lacking (Benjamin 1966, Richardson & Leadbeater 1972). The last-mentioned acephalous group consists of two species, one is *P. indica* and the other is *P. benjaminii* (Embree) Benjamin. As pointed out by Benjamin, the "head-cell" of *P. indica*, though morphologically similar to that of *P. xenophila*, differs from the latter in having the ability to germinate. This cell is consequently regarded as a basal spore of a branched merosporangium but not as a true head-cell. *P. indica* is distinguished from the present species in that the merosporangia are composed of 2-5 branches, each containing 4-7 spores, and in having distinct, stout main stalks of sporophores. On the other hand it is also difficult to regard this fungus as identical with *P. benjaminii*, which produces monosporous sporangiola on tiny apiculi terminating the ultimate branchlets. Finally as for zygospore architecture, the very rough, conical projections of this species show a striking contrast to reticulation of both *P. benjaminii* and *P. indica* var. *shantiniketna* B. R. Mehrotra & Kakkar.

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Piptocephalis minuta（エダカビ科，ケカビ目）を新種として記載，報告する。従来，エダカビ属を最もよく特徴づけてきたのは，脱落性の“head-cell”（分節胞子嚢形成細胞）であるが，近年，この head-cell を欠く2種が発表されている。本種は head-cell を欠く第3番目の種類となり，次の特徴が挙げられる。1）head-cell を完全に欠き，各端枝の先端に唯一つの分節胞子嚢を形成する。2）胞子嚢柄は匍匐菌糸から横枝を打つようにして生じ，他種において見られるような顕著に分化した太い主軸を持たない。3）接合子は粗面で，多数のとげ状要素より成る円錐形の突起で覆われる。

○高等植物分布資料 (90) Materials for the distribution of vascular plants in Japan (90)

○ヤブミョウガ *Pollia japonica* Thunb. 白石市在住の相場清一氏は，昭和50年8月18日，宮城県丸森町次郎太郎山々麓（阿武隈川南岸，標高約70m）〔桑折 403376-43〕で本種の小群落を見出した。筆者は，氏の案内で8月24日を初め，3回にわたって自生地を観察することができた。小群落は，15m ほど間隔をもった2ケ所からなり，一方は，開花個体3株（草丈 30～50cm）を含む10株にも満たない小群で，高木層のスギ（植林）が伐採されたため壊滅寸前の状態にある。他方は，開花しているものはなかったが，草丈 50～60cm の株を筆頭にして，走出枝によって繁殖した小さな個体が約60株確認できた。北西へ約30度の傾斜をもつこの自生地周辺には，オオバノイノモトソウやフトボナギナタコウジュが多く見られ，数十m離れた岩場にはマメズタの着生もあり，附近一帯にはその他の暖温帯性植物が豊富である。

本種は，従来，日本海側では飛島，太平洋ではいわきまで知られていた。従って，本自生地は，太平洋側における最北の産地と思われる。なお，8月24日に採集した標本は，国立科学博物館（TNS 334866）の標本庫に納めてある。

（宮城県白石市[redacted]　上野雄規）